DRAFT
ENGINEERING EVALUATION
Versailles
Plant: 18493
Application: 16215

BACKGROUND
Versailles has applied to obtain an Authority to Construct (AC) and/or a Permit to Operate (PO) for the following equipment:

S-1
Emergency Standby Diesel Generator at 10 Crystal Springs Road
Cummins, Model: DQDAA, Year: 2006 San Mateo, CA 94401
399 BHP, 2.63 MMBTU/hr

These generators will be located at ***10 Crystal Springs Road in San Mateo, CA***. They will provide emergency power (in the event of a blackout) for all essential electrically powered equipment at the Versailles Facility. These emergency engines must be periodically tested to ensure that they will generate power when needed. Testing or maintenance may not be conducted between 7:30 a.m. and 3:30 p.m. on days when school is in session.

EMISSIONS
The engine, S-1, passed the toxic screening analysis at 50 hr/yr with a maximum estimated cancer risk of 3.4 in a million. The emissions calculation is as follows:

Annual Average Emissions:
Basis:
- 399 hp output rating or 298kW
- 50 hr/yr operation for testing and maintenance
- NMHC+NOx, CO and PM10 emission factors provided by CARB Certification with Executive Order U-R-002-0331
- POC was assumed to be 5% of the NMHC+NOx CARB certified emission factor

NMHC + NOx:	3.9 g/kW-hr
NMHC (~ POC):	0.195 g/kW-hr
NOx:	3.705 g/kW-hr
CO:	3.2 g/kW-hr
PM_{10}:	0.16 g/kW-hr

POC:
= (50 hr/yr)(298 kW)(0.195 g/kW-hr)(lb/454 g)
= 6.40 lb/yr or **0.0032** TPY

NOx:
= (50 hr/yr)(298 kW)(3.705 g/kW-hr)(lb/454 g)
= 121.60 lb/yr or **0.061** TPY

CO:
= (50 hr/yr)(298 kW)(3.2 g/kW-hr)(lb/454 g)
= 105.02 lb/yr or **0.053** TPY

PM10:
= (50 hr/yr)(298 kW)(0.16 g/kW-hr)(lb/454 g)
= 5.25 lb/yr or **0.0026** TPY

SO_2 emissions are quantified based on the full conversion of 0.0015 wt% (~ 15 ppm) sulfur in the ULS diesel fuel with a density of 7.206 lbs/gal that is consumed at a rate of 19.2 gal/hr.

SO_2:
= (0.000015 lb S/lb fuel)(7.206 lb fuel/gal fuel)(19.2 gal fuel/hr)(64 lb SO2/32 lb S)(50 hr/yr)
= **0.208** lb/yr or **0.000104** TPY

Daily Emissions:
Daily emissions are calculated to establish whether a source triggers the requirement for BACT (10 lb/highest day total source emissions for any class of pollutants). 24-hr/day of operation will be assumed since no daily limits are imposed on intermittent and unexpected operations.

POC:
= (24 hr/day)(298 kW)(0.195 g/hp-hr)(lb/454 g) = **3.07** lb/day

NOx:
= (24 hr/day)(298 kW)(3.705 g/hp-hr)(lb/454 g) = **58.37** lb/day

CO:
= (24 hr/day)(298 kW)(3.2 g/hp-hr)(lb/454 g) = **50.41** lb/day

PM10:
= (24 hr/day)(298 kW)(0.16 g/hp-hr)(lb/454 g) = **2.52** lb/day

SO_2 emissions are quantified based on the full conversion of 0.0015 wt% (~ 15 ppm) sulfur in the ULS diesel fuel with a density of 7.206 lbs/gal that is consumed at a rate of 27 gal/hr.

SO_2:
= (0.000015lb S/lb fuel)(7.206lb fuel/gal fuel)(19.2gal fuel/hr)(64lb SO2/32lb S)(24 hr/day)
= **0.0996** lb/day

PLANT CUMULATIVE INCREASE

Versailles is a new facility. Therefore, the District's database does not contain information on existing emissions at the plant. Table 1 summarizes the cumulative increase in criteria pollutant emissions that will result at Plant 18493 from the operation of S-1.

Table 1

Pollutant	Current plant emissions (TPY)	Increase in plant emissions associated with this application (TPY)	Cumulative emissions (Current + Increase) (TPY)
NOx	0	0.0304	0.0304
POC	0	0.0016	0.0016
CO	0	0.0263	0.0263
PM10	0	0.00013	0.00013
SO2	0	0.000052	0.000052

TOXIC RISK SCREENING ANALYSIS

The cancer risk is calculated based on the emission rate of diesel exhaust particulate matter. Diesel exhaust particulate matter is used as a surrogate for all toxic contaminants found in diesel exhaust. Table 2 shows the emission rate of Diesel particulate matter and the trigger level for a Toxic Risk Screen.

Table 2

TAC	TAC Emissions from S-4[1] (lb/year)	Trigger Level (lb/yr)[2]	Toxic Risk Screen Required?
Diesel Particulate Matter	2.62	0.58	Yes

Because the proposed emissions exceed the risk screening trigger level for diesel exhaust particulate matter in Table 2-5-1, a risk screening was performed.

In order for these engines to meet the risk level set by the District's Risk Management Policy, the applicant has requested that S-1's hours of operation, excluding periods when operation is required due to emergency conditions, be limited to no more than 50 hours per year. Results from the health risk screening analysis indicate that the maximum cancer risk is estimated at 3.4 in a million if the engine were to run for 50 hours/year.

Estimates of residential risk assume exposure to annual average toxic air contaminate concentrations occur 24 hours per day, 350 days per year, for a 70-year lifetime. Risk estimates for offsite workers assume exposure occurs 8 hours per day, 245 days per year, for 40 years. Risk estimates for students assume a higher breathing rate, and exposure is assumed to occur 10 hours per day, 36 weeks per year, for 9 years.

[1] Assuming S-4 is operated for 25 hours/year for Maintenance & Testing.
[2] TAC trigger levels found in Regulation 2, Rule 5, Table 2-5-1.

Based on 50 hours per year of operation, the emergency generator passed the Health Risk Screening Analysis (HRSA) conducted on July 3, 2007 by the District's Toxic Evaluation Section. This source poses no significant toxic risk, since the increased cancer risk to the maximally exposed receptor (resident) is 3.4 in a million. The hazard index for a worker is 0.002. The increased cancer risk to a worker is 2.8 in a million and the hazard index is 0.002. The increased cancer risk to students is 0.05 in a million and the hazard index is 0.0001. In accordance with the District's Risk Management Policy, the above risk level is considered acceptable for an engine such as S-1 that meets the current TBACT requirements. For more information on the District's Risk Management Policy, please see:

http://www.baaqmd.gov/pmt/air_toxics/risk_procedures_policies/diesel_rmp_011102.pdf

BACT

In accordance with Regulation 2, Rule 2, Section 301, BACT is triggered for any new or modified source with the potential to emit 10 pounds or more per highest day of POC, NPOC, NOx, CO, SO_2 or PM_{10}.

BACT is triggered for NOx and CO since the maximum daily emissions of the above pollutant exceeds 10 lb/day. Please refer to the discussion on "Daily Emissions" in page 2 of this evaluation. BACT for this source is presented in the current BAAQMD BACT/TBACT Workbook for this source category as shown below:

Source:	***IC Engine - Compression Ignition***	Revision:	***5***
		Document #:	***96.1.2***
Class:	***> or = 175 horsepower output rating***	Date:	***01/11/02***

Determination

POLLUTANT	BACT 1. Technologically Feasible/ Cost Effective 2. Achieved in Practice 3. TBACT	TYPICAL TECHNOLOGY
POC	1. *0.30 g/bhp-hr [62 ppmvd @ 15% O_2] [a,b]* 2. *1.5 g/bhp-hr [309 ppmvd @ 15% O_2] [b,c]*	1. *Catalytic Oxidation and CARB or EPA (or equivalent) low-total hydrocarbon emitting certified engine [a,b]* 2. *CARB or EPA (or equivalent) low-total hydrocarbon emitting certified engine [b,c]*
NOx	1. *1.5 g/bhp-hr [107 ppmvd @ 15% O_2] [a,b]* 2. *6.9 g/bhp-hr [490 ppmvd*	1. *Selective Catalytic Reduction (SCR) + Timing Retard + Turbocharger w/ Intercooler [a,b]* 2. *Timing Retard $\leq 4^o$ + Turbocharger w/ Intercooler [a,b,c]*

	@ 15% O_2] [a,b,c] *3. 6.9 g/bhp-hr [490 ppmvd @ 15 % O_2]*	3. *Timing Retard ≤ 4° + Turbocharger w/ Intercooler*
SO_2	1. *n/d* 2. *fuel oil < 0.05% sulfur* [a,b]	1. *n/d* 2. *Fuel Selection* [a,b]
CO	1. *n/s* 2. 2.75 *g/bhp-hr [319 ppmvd @ 15% O2]* [b,c]	1. *Catalytic Oxidation* [b] 2. *CARB or EPA (or equivalent) low-CO emitting certified engine b,c*
PM_{10}	1. *n/d* 2. *If practical, gas-fueled engine or electric motor. If not, "California Diesel Fuel" (fuel oil w/ < 0.05% by weight sulfur and < 20% by volume aromatic hydrocarbons)* [b] 3. *0.1 grams/bhp-hr*	1. *Catalyst Guard Bed* [a,b] 2. *Fuel Selection* [b,d] 3. *CARB or EPA (or equivalent) low-particulate matter emitting certified engine, or particulate filter*
NPOC	1. *n/a* 2. *n/a*	1. *n/a* 2. *n/a*

References

a. CARB/CAPCOA Clearinghouse
b. BAAQMD NOTE: IC Engine BACT and TBACT is a low emitting, spark-ignited, gas-fueled engine with lean burn combustion or rich burn with non-selective catalytic reduction, or electric motor. A diesel engine will be permitted only if a gas-fueled engine, or electric motor, is not practical (e.g., a remote location without natural gas availability or electric power, or only a diesel engine will meet the portability and/or power/torque/rpm requirements of the application under review, or the engine is used exclusively for emergency use during involuntary loss of power).
c. Timing retard, etc. controls alone may be acceptable only in very limited situations for temporary sources.

The more restrictive BACT 1 standards levels do not apply for engines used exclusively for emergency use during involuntary loss of power as per Reference b, Document 96.1.2 of the BAAQMD BACT Guidelines for IC Engines. Hence, the owner/operator has to meet the BACT 2 limits.

It can be seen from above that S-1 satisfies the current BACT 2 standard for NOx (6.9 g/hp-hr) and CO (2.75 g/hp-hr) because the CARB certified level is below the BACT 2 requirements.

Table 2: BACT 2 Compliance

Table 2	***CARB Certified Emissions g/kw-hr***	***CARB Certified Emissions g/bhp-hr***	***BACT Emissions g/bhp-hr***
POC	0.195	0.15	1.5
NOx	3.705	2.76	6.9

CO	3.2	2.39	2.75
PM	0.13	0.10	0.15

OFFSETS

Table 3 summarizes the increase in criteria pollutant emissions that will result at Plant 18493 from the operation of S-1.

Table 3: Offsets Requirements

Pollutant	Increase in Emissions At Plant Since April 5, 1991 [3] (TPY)	Increase in Emissions Associated With This Application (TPY)	Total Emissions (Post 4/5/91 + Increase) (TPY)	Regulation 2-2-302 and 2-2-303 Offset Triggers (TPY)
NOx	0	0.026	0.026	> 10; < 35
POC	0	0.0018	0.0018	> 10; < 35
CO	0	0.0039	0.0039	NA
PM10	0	0.00048	0.00048	> 1
SO2	0	0.000026	0.000026	> 1

It can be seen from Table 3 that S-1 does not trigger any offset. Therefore, offsets are not warranted for any emission.

NSPS

The engine is subject to 40 CFR 60, Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines because it was manufactured after April 1, 2006, as required by Section 60.4200(a)(2)(i).

The engine has a total displacement of 8.9 liters and has 6 cylinders, so each cylinder has a volume of less than 10 liters. The engine is a pre-2007 model year engine and is not a fire pump. Section 60.4205(a) requires these engines to comply with the emission standards in Section 60.4202, which refers to 40CFR89.112 and 40CFR89.113 for all pollutants. For engines between 300 and 600 hp, these standards are:

NMHC+NOx: 3.0 g/hp-hr
CO: 2.6 g/hp-hr
PM: 0.15 g/hp-hr
20% opacity during acceleration mode
15% opacity during lugging mode
50% opacity during peaks in acceleration or lugging mode

According to CARB Executive Order U-R-002-0331, the engine will comply with the standards.

[3] In PSDP do the following steps to get data on the aggregate sum of all increases as defined in Reg. 2-2-212 after April 5, 1991: option 1 → type of pollutant.

Sections 60.4206 and 60.4211(a) require that the owner/operator operate and maintain the engine according to the manufacturer's written instructions or procedures developed by the owner or operator that are approved by the engine manufacturer, over the entire life of the engine. This requirement will be in the permit conditions.

Section 60.4207(a) requires that by October 1, 2007, the owner/operator must use fuel that complies with 40 CFR 80.510(a). This means that the fuel must have a maximum sulfur content of 500 parts per million (ppm), a cetane index of 40 or a maximum aromatic content of 35 percent by volume. Section 60.4207(b) requires that by October 1, 2010, the owner/operator must use fuel that complies with 40 CFR 80.510(b). This means that the fuel must have a maximum sulfur content of 15 parts per million (ppm), and the same cetane index or aromatic content as previously stated. California Air Resources Board (CARB) diesel fuel, which has a maximum sulfur content of 15 ppm and a maximum aromatic content of 10 to 20 percent by volume, will be required in the permit conditions. Staff in the Stationary Source Division of CARB indicate that some verified diesel fuel in California may have a maximum aromatic content greater than 10 percent if the fuel has been demonstrated to have an equal or greater emissions benefit as diesel fuel with maximum aromatic content of 10 percent, but no verified fuel has had an aromatic content greater than 25 percent.

Section 60.4209(a) requires a non-resettable hour meter. This requirement is already in the standard permit conditions.

The engine will comply with the requirements of Section 60.4211(b)(1) because it has been certified in accordance with 40 CFR Part 89.

The engine will comply with the requirement in Section 60.4211(e) to run for less than 100 hours per year for maintenance checks and readiness testing, and the prohibition of running for any reason other than emergency operation, maintenance, and testing because they are limited by permit condition to 50 hours per year for reliability testing and otherwise may only operate for emergencies.

The owner/operator is not required to perform tests in accordance with Section 60.4212 or 60.4213.

Section 60.4214(b) states that owner/operators do not have to submit an initial notification to EPA for emergency engines.

Because the engine does not have a diesel particulate filter, it is not subject to Section 60.4209(b) (installation of a backpressure monitor) or 60.4214(c) (records of corrective action taken after high backpressure).

The owner/operator is required to comply with certain sections of 40 CFR 60, Subpart A, General Provisions. These are listed in the permit conditions. [Subpart IIII, Table 8]

NESHAP

This engine is not subject to 40 CFR 63, Subpart ZZZZ, National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines, because it is not located at a major facility for hazardous air pollutants

CARB STATIONARY DIESEL ENGINE ATCM

The State Office of Administrative Law approved the Airborne Toxic Control Measure (ATCM) on November 8, 2004. State law requires the local Air Districts to implement and enforce the requirements of the ATCM. Effective January 1, 2005, there is a prohibition on the operation of new diesel emergency standby engines greater than 50 bhp unless the following operating requirements and emission standards are met:

"Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations.

Diesel PM – General Requirements

1. Meet 0.15 g/bhp-hr PM standard
2. Operate 50 hours per year, or less, for maintenance and testing (except emergency use and emissions testing)

HC,NOx, NMHC+NOx, CO

1. Meet standards for off-road engines of the same model year and horsepower rating
   As specified in the OFF-Road Compression Ignition Engine Standards;
   Or if no standards have been established
2. Meet the Tier 3 standards in Title 13, CCR, Section 2423 for off-road engines of the same horsepower rating, irrespective of the new engine's model year

This emergency standby diesel engine (S-1) is in compliance with the above ATCM requirements. The diesel engine will operate for no more than 50 hours per year for maintenance and reliability testing, as requested. This engine is subject to the ATCM Tier 3 requirements for HC, NOx, NMHC+NOx and CO. As shown in the Table 4., the engines meet these requirements.

Table 4. ATCM Tier 3 Compliance

	CARB g/kW-hr	ATCM Tier 3 g/kW-hr
NMHC+NOx	3.9	4.0
CO	3.2	3.5
PM	0.16	0.2

STATEMENT OF COMPLIANCE

Source S-1 is subject to and expected to be in compliance with the requirements of District Regulation 1-301 (*Public Nuisance*), Regulation 6-303 (*Particulate Matter and Visible Emissions*), Regulation 9-1 (*Sulfur Dioxide*) and Regulation 9-8 (*NOx and CO from Stationary Internal Combustion Engines*). In order to ensure compliance with the requirements of these regulations, the facility will be conditionally permitted to meet the requirements.

From Regulation 1-301, no person shall discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance or annoyance to any considerable number of persons or the public; or which endangers the comfort, repose, health or safety of any such persons or the public, or which causes, or has a natural tendency to cause, injury or damage to business or property. For purposes of this section, three or more violation notices validly issued in a 30 day period to a facility for public nuisance shall give rise to a rebuttable presumption that the violations resulted from negligent conduct.

S-1 is subject to the limitations of Regulation 6-303 (*Particulate Matter and Visible Emissions*). Regulation 6, Section 303 states that a person shall not emit for a period or periods aggregating more than three minutes in any hour, a visible emission that is as dark or darker than No. 2 on the Ringelmann Chart, or of such opacity as to obscure an observer's view to an equivalent or greater degree, nor shall said emission, as perceived by an opacity sensing device in good working order, where such device is required by District Regulations, be equal to or greater than 40% opacity. This low PM10 emitting engine is not expected to produce visible emissions or fallout in violation of this regulation, and it will be assumed to be in compliance with Regulation 6 pending a regular inspection

S-1 is also subject to the SO_2 limitations of Regulation 9-1-301 (*Limitation on Ground Level Concentrations of Sulfur Dioxide*), Regulation 9-1-302 (*Limitations Sulfur Dioxide Emissions*) and 9-1-304 (*Burning of Solid and Liquid Sulfur Dioxide Fuel*). From Regulation 9-1-301, the ground level concentrations of SO_2 will not exceed 0.5 ppm continuously for 3 consecutive minutes or 0.25 ppm averaged over 60 consecutive minutes, or 0.05 ppm averaged over 24 hours. Per Regulation 9, Rule 1, Section 302, a person shall not emit from any source a gas stream containing sulfur dioxide in excess of 300 ppm (dry). And Regulation 9, Rule 1, Section 304, states that a person shall not burn any liquid fuel having sulfur content in excess of 0.5% by weight. Compliance with both Regulations 9-1-302 and 9-1-304 is likely since California law mandates using diesel fuel with a 0.05% by weight sulfur.

Regulation 9-8 "NOx and CO from Stationary Internal Combustion Engines." From Regulation 9-8-110.4, the source is not subject to the requirements of Regulations 9-8-301 (*Emission Limits on Fossil Derived Fuel Gas*), 9-8-302 (*Emission Limits on Waster Derived Fuel Gas*), and 9-8-502(*Record Keeping*).

S-1 is exempt from Regulation 9-8-502 however; it is subject to the monitoring and record keeping procedures described in Regulation 9-8-530(*Emergency Standby Engines, Monitoring and Recordkeeping***)**. The requirements of this Regulation are included in the permit conditions

This project is considered to be ministerial under the District's CEQA Regulation 2-1-311 and therefore is not subject to CEQA review. The engineering review for this project requires only the application of standard permit conditions and standard emission factors in accordance with Permit Handbook Chapter 2.3.

The project is within 1000 feet of the nearest school and therefore the owner/operator is subject to the public notification requirements of Reg. 2-1-412. A public notice was prepared and sent. The public notices were sent to:

All addresses within 1000 feet of the diesel generator, and

Parents and guardians of students at St. Matthew's Episcopal Day School.

Offsets, PSD, and NESHAPS are not triggered.

PERMIT CONDITIONS

Condition # 22850

1. Operating for reliability-related activities is limited to 50 hours per year per engine.
   [Basis: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(2)(B)(3) or Regulation 2-5]

2. The owner or operator shall operate each emergency standby engine only for the following purposes: to mitigate emergency conditions, for emission testing to demonstrate compliance with a District, state or Federal emission limit, or for reliability-related activities (maintenance and other testing, but excluding emission testing). Operating while mitigating emergency conditions or while emission testing to show compliance with District, state or Federal emission limits is not limited.
   [Basis: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(2)(A)(3)] or (e)(2)(B)(3)]

3. The owner/operator shall operate each emergency standby engine only when a non-resettable totalizing meter (with a minimum display capability of 9,999 hours) that measures the hours of operation for the engine is installed, operated and properly maintained.
   [Basis: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(4)(G)(1)]

4. Records: The owner/operator shall maintain the following monthly records in a District-approved log for at least 36 months from the date of entry (60 months if the facility has been issued a Title V Major Facility Review Permit or a Synthetic Minor Operating Permit). Log entries shall be retained on-site, either at a central location or at the engine's location, and made immediately available to the District staff upon request.
   a) Hours of operation for reliability-related activities (maintenance and testing).
   b) Hours of operation for emission testing to show compliance with emission limits.
   c) Hours of operation (emergency).
   d) For each emergency, the nature of the emergency condition.
   e) Fuel usage for each engine(s).

   [Basis: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(4)(I), (or, Regulation 2-6-501)]

5. At School and Near-School Operation: If the emergency standby engine is located on school grounds or within 500 feet of any school grounds, the following requirements shall apply:

   The owner or operator shall not operate each stationary emergency standby diesel-fueled engine for non-emergency use, including maintenance and testing, during the following periods:

a) Whenever there is a school sponsored activity (if the engine is located on school grounds).
b) Between 7:30 a.m. and 3:30 p.m. on days when school is in session.

"School" or "School Grounds" means any public or private school used for the purposes of the education of more than 12 children in kindergarten or any of grades 1 to 12, inclusive, but does not include any private school in which education is primarily conducted in a private home(s). "School" or "School Grounds" includes any building or structure, playground, athletic field, or other areas of school property but does not include unimproved school property.
[Basis: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(2)(A)(1)] or (e)(2)(B)(2)]

Condition # 23689

1. The owner/operator shall operate and maintain the engine according to the manufacturer's written instructions or procedures developed by the owner/operator that are approved by the manufacturer over the entire life of the engine. The owner/operator may only change those settings that are permitted by the manufacturer.
[Basis: 40 CFR 60.4206, 60.4211(a)]

2. The owner/operator shall install and configure the engine according to the manufacturer's specifications.
[Basis: 40 CFR 60.4211(b)(1)]

3. The owner/operator shall fuel the engine with California Air Resources Board (CARB) diesel fuel with a sulfur content of 15 ppmw or less. Alternative fuel may be used if approved by BAAQMD.
[Basis: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(1)(A); 40 CFR 60.4207; 40 CFR 80.510]

4. The owner/operator shall comply with the following sections of 40 CFR 60, Subpart A, General Provisions: 60.1-60.10, 60.12, 60.14-60.17, 60.19.
[Basis: 40 CFR 60, Subpart IIII, Table 8]

RECOMMENDATION

Issue Versailles an Authority to Construct (AC) for the following equipment:

S-1
Emergency Standby Diesel Generator at 10 Crystal Springs Road
Cummins, Model: DQDAA, Year: 2006 San Mateo, CA 94401
399 BHP, 2.63 MMBTU/hr

_____

Mactarun Malik
Air Quality Engineering Intern
Engineering Division
DATE: 10/11/07